LALP-02-0149

Nitric Acid Recycle System

Nuclear Materials Technology Division

Nitric acid used for dissolution of plutonium - 239 matrices and subsequent recovery of the plutonium has historically been discharged with treated water effluent as nitrate salts. A distillation unit has been recently designed and installed at the Plutonium Facility (TA-55). The purpose is to seperate the acid into an alomost pure water stream and a concentrated nitric acid sream. This essentially stops the discharge of nitrate salts with effluent treated water.

Nitric Acid Reboiler

Acid streams from the nitric acid aqueous processing line at TA-55 are sent to the nitric acid process evaporators where residual salts are concentrated into a stream to be stabilized in cement. The nitric acid and water that are evaporated overhead is the stream that has historically been transferred to the Radioactive Liquid Waste Treatment Facility at TA-50. Now, however this overhead stream will be fractionated in the distillation unit into the water and concentrated acid streams mentioned above. The water steam will have a nitric acid concentration that is low enough to meet the treated water effluent nitrate discharge limit. The concentrated acid stream will be strong enough to be recycled and used for plutonium matrix dissolution.

Nitric Acid Recycle System Control Room

Nitric acid and water can be easily separated by distillation. Even though the distillation colunm height is limited by the 13-foot cieling height, the use of high efficiency column packing provides sufficient separatin capability. The most difficult challenge is time. Because TA-55 is operated 10 hous per day, the column must be started up and lined out very quickly in order to be productive. Traditional distillation processes are started up and brought to specification products in periods ranging from one to several days. This contrasted with a need to startup and reach specification products in one to one and a half hours. This requires special control techniques that were developed by operationg a small test colunm in a cold lab.

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